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THE CLAIMS

What is claimed is:

- 1 1. A multiple access communication protocol, comprising:
 - 2 an uplink channel having a plurality of frames, each frame having a first
 - 3 selectable number of minislots and a second selectable number of slots, a reservation request
 - 4 of a first type being sent into a first selected minislot of a selected frame of the uplink
 - 5 channel when information of a first type is to be sent, the reservation request of the first type
 - 6 requesting an assignment of at least one slot for transmitting information of the first type in
 - 7 at least one frame that is subsequent to the selected frame, a reservation request of a second
 - 8 type being sent into a second selected minislot of the selected frame when the second
 - 9 selected minislot is available in the selected frame and when information of a second type is
 - 10 to be sent, the reservation request of the second type requesting an assignment of at least one
 - 11 slot for transmitting information of the second type in at least one frame that is subsequent to
 - 12 the selected frame, the reservation request of the second type contending for the second
 - 13 selected minislot based on a blocked binary tree algorithm; and
 - 14 a downlink channel containing a feedback message having minislot
 - 15 assignment information for sending reservation requests of the first and the second type, slot
 - 16 assignment information for transmitting information of the first and the second type, minislot
 - 17 contention information for the reservation requests of the second type sent in the selected
 - 18 frame, and allocation time information for the reservation requests of the second type to be

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19 initiated in a frame after the selected frame on behalf of the information of the second type,
20 the feedback message occurring prior to an end of the selected frame of the uplink channel.

1 2. The multiple access communication protocol according to claim 1, wherein
2 the reservation requests of the second type are sent into the second selected minislots, each
3 second selected minislot being selected by a central station for a contention subgroup of
4 terminals identified by a level in a virtual stack from a plurality of minislots available for
5 sending the reservation requests of the second type that have experienced a collision not yet
6 resolved.

1 3. The multiple access communication protocol according to claim 1, wherein
2 the reservation requests of the second type are sent into the second selected minislots, each
3 second selected minislot being selected independently and at random with equal probability
4 from a plurality of minislots available for sending new reservation requests of the second
5 type on behalf of the information of the second type arriving between an old allocation time
6 and a new allocation time.

1 4. The multiple access communication protocol according to claim 2, wherein
2 the reservation request of the second type is sent when a virtual stack level associated with

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3 the reservation request of the second type has a smaller value than the number of minislots
4 available for sending reservation requests of the second type.

1 5. The multiple access communication protocol according to claim 3, wherein
2 the reservation request of the second type is sent when the number of virtual stack levels
3 associated with the reservation requests of the second type undergoing collision resolution is
4 smaller than the number of minislots available for sending reservation requests of the second
5 type.

1 6. The multiple access communication protocol according to claim 1, wherein
2 the feedback message includes slot assignment information for at least one frame following
3 the selected frame.

1 7. The multiple access communication protocol according to claim 1, wherein
2 the feedback message includes information relating to a number of minislots available in a
3 frame after the selected frame for sending reservation requests of the second type, and
4 information relating to a new allocation time for reservation requests of the second type to be
5 initiated in a frame after the selected frame on behalf of information of the second type.

1 8. The multiple access communication protocol according to claim 1, wherein
2 the minislot contention information includes information relating to a successful sending of
3 the reservation requests of the second type.

1 9. The multiple access communication protocol according to claim 1, wherein
2 the minislot contention information includes information relating to a collision of the
3 reservation requests of the second type.

1 10. The multiple access communication protocol according to claim 1, further
2 comprising a step of adjusting a virtual stack level value identifying a contention subgroup of
3 terminals sending the reservation request of the second type based on the minislot contention
4 information.

1 11. The multiple access communication protocol according to claim 10, wherein
2 the step of adjusting the virtual stack level value includes a step of subtracting one from the
3 virtual stack level value identifying the contention subgroup of terminals sending the
4 reservation request of the second type for each noncolliding contention subgroup of terminals
5 identified by a virtual stack level that is less than the virtual stack level associated with the
6 reservation request of the second type.

1 12. The multiple access communication protocol according to claim 10, wherein
2 the step of adjusting the virtual stack level value includes a step of adding one to the virtual
3 stack level value identifying the contention subgroup of terminals sending the reservation
4 request of the second type for each colliding contention subgroup of terminals identified by a
5 virtual stack level that is less than the virtual stack level associated with the reservation
6 request of the second type.

1 13. The multiple access communication protocol according to claim 1, wherein
2 the information of the first type is a talkspurt of a voice message, and the information of the
3 second type is a data message.

1 14. The multiple access communication protocol according to claim 1, wherein
2 the information of the first type is transmitted in the uplink channel in a slot in a frame that is
3 subsequent to the selected frame that is assigned in response to the reservation request of the
4 first type.

1 15. The multiple access communication protocol according to claim 14, wherein
2 an end indication message is sent in the slot in the frame that is subsequent to the selected

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1 frame that is assigned in response to the reservation request of the first type when
2 transmission of the information of the talkspurt is ending.

1 16. The multiple access communication protocol according to claim 15, wherein
2 the downlink channel contains a message having a minislot assignment in response to the end
3 indication message.

1 17. The multiple access communication protocol according to claim 1, wherein
2 the first selectable number of minislots and the second selectable number of slots are each
3 predetermined.

1 18. The multiple access communication protocol according to claim 1, wherein
2 the first selectable number of minislots and second selectable number of slots are each
3 adjustable.

1 19. The multiple access communication protocol according to claim 1, wherein
2 the uplink and downlink channels are part of a time division multiple access communication
3 system.

1 20. The multiple access communication protocol according to claim 1, wherein
2 the uplink and downlink channels are part of a frequency division multiple access
3 communication system.

1 21. The multiple access communication protocol according to claim 1, wherein
2 the uplink and downlink channels are part of a code division multiple access communication
3 system.

1 22. The multiple access communication protocol according to claim 1, wherein
2 the at least one slot assigned for transmitting information of the first type is assigned based
3 on a contention-free reservation mechanism.

1 23. A method for providing multiple access to a communication channel, the
2 method comprising steps of:

3 forming an uplink channel having a plurality of frames, each frame having a
4 first selectable number of minislots and a second selectable number of slots;

5 receiving a reservation request of a first type contained in a first selected
6 minislot of a selected frame of the uplink channel when information of a first type is ready to
7 be sent, the reservation request of the first type requesting an assignment of at least one slot

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8 for transmitting information of the first type in at least one frame that is subsequent to the
9 selected frame;
10 assigning at least one first slot in response to the received reservation request
11 of the first type;
12 receiving a reservation request of a second type contained in a second selected
13 minislot of the selected frame when the second selected minislot is available in the selected
14 frame and when information of a second type is ready to be sent, the reservation request of
15 the second type requesting an assignment of at least one slot for transmitting information of
16 the second type in at least one frame that is subsequent to the selected frame, the reservation
17 request of the second type contending for the second selected minislot based on a blocked
18 binary tree algorithm;
19 broadcasting a feedback message in a downlink channel before an end of the
20 selected frame, the feedback message containing minislot assignment information for
21 sending reservation requests of the first and the second type, slot assignment information for
22 transmitting information of the first and the second type, minislot contention information for
23 the reservation requests of the second type received in the selected frame, and allocation time
24 information for the reservation requests of the second type to be initiated in a frame after the
25 selected frame on behalf of the information of the second type.

1 24. The method according to claim 23, wherein the feedback message includes
2 slot assignment information for at least one frame following the selected frame.

1 25. The multiple access communication protocol according to claim 23, wherein
2 the feedback message includes information relating to a number of minislots available in a
3 frame after the selected frame for sending reservation requests of the second type, and
4 information relating to a new allocation time for reservation requests of the second type to be
5 initiated in a frame after the selected frame on behalf of information of the second type.

1 26. The method according to claim 23, wherein the minislot contention
2 information includes information relating to successful receipt of the reservation requests of
3 the second type.

1 27. The method according to claim 23, wherein the minislot contention
2 information includes information relating to a collision of the reservation requests of the
3 second type.

1 28. The method according to claim 23, wherein the information of the first type is
2 a talkspurt of a voice message, and the information of the second type is a data message.

1 29. The method according to claim 23, further comprising a step of receiving
2 information of the first type in the uplink channel in a slot in a frame that is subsequent to the
3 selected frame that was assigned in response to the reservation request of the first type.

1 30. The method according to claim 29, further comprising a step of receiving an
2 end indication message in the slot in a frame that is subsequent to the selected frame that was
3 assigned in response to the reservation request of the first type when transmission of the
4 information of the first type is ending.

1 31. The method according to claim 30, further comprising a step of broadcasting a
2 message having a minislot assignment in response to the end indication message.

1 32. The method according to claim 23, wherein the first selectable number of
2 minislots and the second selectable number of slots are predetermined.

1 33. The method according to claim 23, wherein the first selectable number of
2 minislots and the second selectable number of slots are adjustable.

1 34. The method according to claim 23, wherein the uplink and downlink channels
2 are part of a time division multiple access communication system.

1 35. The method according to claim 23, wherein the uplink and downlink channels
2 are part of a frequency division multiple access communication system.

1 36. The method according to claim 23, wherein the uplink and downlink channels
2 are part of a code division multiple access communication system.

1 37. The method according to claim 23, wherein the at least one slot assigned for
2 transmitting information of the first type is assigned based on a contention-free reservation
3 mechanism.

1 38. A method for providing multiple access to a communication channel, the
2 method comprising steps of:
3 sending a reservation request of a first type into a first selected minislot of a
4 selected frame of an uplink channel when information of a first type is to be sent, the uplink
5 channel having a plurality of frames, each frame having a first selectable number of minislots
6 and a second selectable number of slots, the reservation request of the first type requesting an
7 assignment of at least one slot for transmitting information of the first type in at least one
8 frame that is subsequent to the selected frame,

9 sending a reservation request of a second type into a second selected minislot
10 of the selected frame when the second selected minislot is available in the selected frame and
11 when information of a second type is to be sent, the reservation request of the second type
12 requesting an assignment of at least one slot for transmitting information of the second type
13 in at least one frame that is subsequent to the selected frame, the reservation request of the
14 second type contending for the second selected minislot based on a blocked binary tree
15 algorithm; and
16 receiving a feedback message from a downlink channel, the feedback message
17 containing minislot assignment information for sending reservation requests of the first and
18 the second type, slot assignment information for transmitting information of the first and the
19 second type, minislot contention information for the reservation requests of the second type
20 sent in the selected frame, and allocation time information for the reservation requests of the
21 second type to be initiated in a frame after the selected frame on behalf of the information of
22 the second type, the feedback message being received prior to an end of the selected frame of
23 the uplink channel.

1 39. The method according to claim 38, wherein the reservation requests of the
2 second type are sent into the second selected minislots, each second selected minislot being
3 selected by a central station for a contention subgroup of terminals identified by a level in a

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4 virtual stack from a plurality of minislots available for sending the reservation requests of the
5 second type that have experienced a collision not yet resolved.

1 40. The method according to claim 38, wherein the reservation requests of the
2 second type are sent into the second selected minislots, each second selected minislot being
3 selected independently and at random with equal probability from a plurality of minislots
4 available for sending new reservation requests of the second type on behalf of the
5 information of the second type arriving between an old allocation time and a new allocation
6 time.

1 41. The method according to claim 39, wherein the reservation request of the
2 second type is sent when a virtual stack level associated with the reservation request of the
3 second type has a smaller value than the number of minislots available for sending
4 reservation requests of the second type.

1 42. The multiple access communication protocol according to claim 40, wherein
2 the reservation request of the second type is sent when the number of virtual stack levels
3 associated with the reservation requests of the second type undergoing collision resolution is
4 smaller than the number of minislots available for sending reservation requests of the second
5 type.

1 43. The method according to claim 38, wherein the feedback message includes
2 slot assignment information for at least one frame following the selected frame.

1 44. The method according to claim 38, wherein the feedback message includes
2 information relating to a number of minislots available in a frame after the selected frame for
3 sending reservation request of the second type, and information relating to a new allocation
4 time for reservation requests of the second type to be initiated in a frame after the selected
5 frame on behalf of information of the second type.

1 45. The method according to claim 38, wherein the minislot contention
2 information includes information relating to a successful sending of the reservation requests
3 of the second type.

1 46. The method according to claim 38, wherein the minislot contention
2 information includes information relating to a collision of the reservation requests of the
3 second type.

1 47. The method according to claim 38, further comprising a step of adjusting a
2 virtual stack level value identifying a contention subgroup of terminals sending the
3 reservation request of the second type based on the minislot contention information.

1 48. The method according to claim 47, wherein the step of adjusting the virtual
2 stack level value includes a step of subtracting one from the virtual stack level value
3 identifying the contention subgroup of terminals sending the reservation request of the
4 second type for each noncolliding contention subgroup of terminals identified by a virtual
5 stack level that is less than the virtual stack level associated with the reservation request of
6 the second type.

1 49. The method according to claim 47, wherein the step of adjusting the virtual
2 stack level value includes a step of adding one to the virtual stack level value identifying the
3 contention subgroup of terminals sending the reservation request of the second type for each
4 colliding contention subgroup of terminals identified by a virtual stack level that is less than
5 the virtual stack level associated with the reservation request of the second type.

1 50. The method according to claim 38, wherein the information of the first type is
2 a talkspurt of a voice message, and the information of the second type is a data message.

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1 51. The method according to claim 38, wherein the information of the first type is
2 transmitted in the uplink channel in a slot in a frame that is subsequent to the selected frame
3 that is assigned in response to the reservation request of the first type.

1 52. The method according to claim 51, wherein an end indication message is sent
2 in the slot in a frame that is subsequent to the selected frame that is assigned in response to
3 the first reservation request when transmission of the information of the talkspurt is ending.

1 53. The method according to claim 52, further comprising a step of receiving a
2 message from the downlink channel containing a minislot assignment in response to the end
3 indication message.

1 54. The method according to claim 38, wherein the first selectable number of
2 minislots and the second selectable number of slots are each predetermined.

1 55. The method according to claim 38, wherein the first selectable number of
2 minislots and second selectable number of slots are each adjustable.

1 56. The method according to claim 38, wherein the uplink and downlink channels
2 are part of a time division multiple access communication system.

1 57. The method according to claim 38, wherein the uplink and downlink channels
2 are part of a frequency division multiple access communication system.

1 58. The method according to claim 38, wherein the uplink and downlink channels
2 are part of a code division multiple access communication system.

1 59. The method according to claim 38, wherein the at least one slot assigned for
2 transmitting information of the first type is assigned based on a contention-free reservation
3 mechanism.

1 60. A system for providing multiple access to a communication channel, the
2 system comprising:
3 a central station; and
4 a plurality of terminal units coupled to the central station through a
5 communication channel, the communication channel including an uplink channel having a
6 plurality of frames, each frame having a first selectable number of minislots and a second
7 selectable number of slots, a first terminal unit sending a reservation request of a first type
8 into a first selected minislot of a selected frame when the first terminal has information of a
9 first type to be sent to the central station, the reservation request of the first type requesting

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10 for an assignment of at least one slot for transmitting information of the first type in at least
11 one frame that is subsequent to the selected frame, and a second terminal unit sending a
12 reservation request of a second type for a slot assignment into a second selected minislot of
13 the selected frame when the second selected minislot is available in the selected frame and
14 when the second terminal has information of a second type to be sent to the central station,
15 the reservation request of the second type requesting for an assignment of at least one slot for
16 transmitting information of the second type in at least one frame that is subsequent to the
17 selected frame, the second terminal unit contending for the second selected minislot based on
18 a blocked binary tree algorithm; and

19 the central station receiving the reservation request of the first type when the
20 reservation request of the first type is sent into the first selected minislot and the reservation
21 request of the second type when the reservation request of the second type is sent into the
22 second selected minislot, and broadcasting a feedback message in a downlink channel prior
23 to the end of the selected frame, the feedback message containing minislot assignment
24 information for the first and the second terminal unit to send the reservation request of the
25 first and the second type, slot assignment information for the first and the second terminal
26 unit to send information of the first and the second type, minislot contention information the
27 reservation requests of the second type received by the central station, and allocation time
28 information for the reservation requests of the second type to be initiated by the second

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29 terminal units in a frame after the selected frame on behalf of the information of the second
30 type,

31 the first terminal unit receiving the feedback message and transmitting the
32 information of the first type based on the slot assignment information for the first terminal
33 unit, and

34 the second terminal unit receiving the feedback message when the second
35 terminal unit sends the reservation request of the second type into the second selected
36 minislot, and determining from the minislot contention information whether the second
37 terminal unit successfully contended for the second selected minislot.

1 61. The system according to claim 60, wherein the reservation requests of the
2 second type are sent into the second selected minislots by the second terminal units, each
3 second selected minislot being selected by a central station for a contention subgroup of
4 terminals identified by a level in a virtual stack from a plurality of minislots available for
5 sending the reservation requests of the second type that have experienced a collision not yet
6 resolved.

1 62. The system according to claim 60, wherein the reservation requests of the
2 second type are sent into the second selected minislots, each second selected minislot being
3 selected independently and at random with equal probability from a plurality of minislots

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4 available for the second terminal units to send new reservation requests of the second type on
5 behalf of the information of the second type arriving between an old allocation time and a
6 new allocation time.

1 63. The system according to claim 60, wherein the reservation request of the
2 second type is sent when a virtual stack level associated with the reservation request of the
3 second type has a smaller value than the number of minislots available for sending
4 reservation requests of the second type.

1 64. The system according to claim 60, wherein the reservation request of the
2 second type is sent when the number of virtual stack levels associated with the reservation
3 requests of the second type undergoing collision resolution is smaller than the number of
4 minislots available for sending reservation requests of the second type.

1 65. The system according to claim 60, wherein the feedback message includes slot
2 assignment information for at least one frame following the selected frame.

1 66. The system according to claim 60, wherein the feedback message includes
2 information relating to a number of minislots available in a frame after the selected frame for
3 sending reservation requests of the second type, and information relating to a new allocation

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4 time for reservation requests of the second type to be initiated in a frame after the selected
5 frame on behalf of information of the second type.

1 67. The system according to claim 60, wherein the minislot contention
2 information includes information relating to a successful sending of the reservation requests
3 of the second type.

1 68. The system according to claim 60, wherein the minislot contention
2 information includes information relating to a collision of the reservation requests of the
3 second type.

1 69. The system according to claim 60, wherein the second terminal unit adjusts a
2 virtual stack level value identifying a contention subgroup of the second terminal units based
3 on the minislot contention information.

1 70. The system according to claim 69, wherein the second terminal unit adjusts
2 the virtual stack level value by subtracting one from the virtual stack level value identifying
3 the contention subgroup of the second terminal unit for each noncolliding contention
4 subgroup of the second terminal units identified by a virtual stack level that is less than the
5 virtual stack level associated with the second terminal unit.

1 71. The system according to claim 69, wherein the second terminal unit adjusts
2 the virtual stack level value by adding one to the virtual stack level value identifying the
3 contention subgroup of the second terminal unit for each noncolliding contention subgroup
4 of the second terminal units identified by a virtual stack level that is less than the virtual
5 stack level associated with the second terminal unit.

1 72. The system according to claim 60, wherein the information of the first type is
2 a talkspurt of a voice message, and the information of the second type is a data message.

1 73. The system according to claim 60, wherein the first terminal unit sends the
2 information of the first type in the uplink channel in at least one slot in at least one frame that
3 is subsequent to the selected frame that was assigned in response to the reservation request of
4 the first type.

1 74. The system according to claim 73, wherein the first terminal unit transmits an
2 end indication message in a slot in a frame that is subsequent to the selected frame that was
3 assigned in response to the reservation request of the first type when transmission of the
4 information of the first type is ending.

1 75. The system according to claim 74, wherein the central station broadcasts a
2 message having a minislot assignment in response to the end indication message.

1 76. The system according to claim 60, wherein the first selectable number of
2 minislots and the second selectable number of slots are each predetermined.

1 77. The system according to claim 60, wherein the first selectable number of
2 minislots and the second selectable number of slots are each adjustable.

1 78. The system according to claim 60, wherein the uplink and downlink channels
2 are part of a time division multiple access communication system.

1 79. The system according to claim 60, wherein the uplink and downlink channels
2 are part of a frequency division multiple access communication system.

1 80. The system according to claim 60, wherein the uplink and downlink channels
2 are part of a code division multiple access communication system.

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- 1 81. The system according to claim 60, wherein the at least one slot assigned for
- 2 transmission of the information of the first type is assigned based on a contention-free
- 3 reservation mechanism.